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RECOMMENDATION FOR POSITIONING
OF MAGNETIC COMPASSES IN SHIPS

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RECOMMENDATION FOR POSITIONING OF MAGNETIC COMPASSES IN SHIPS

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RECOMMENDATION FOR POSITIONING OF MAGNETIC COMPASSES IN SHIPS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 18 March 1968, after the draft finalized by the Marine Instruments and Safety Aids Sectional Committee had been approved by the Mechanical Engineering Division Council.

0.2 The reliability and accuracy of magnetic compasses depends, to a great extent, upon their position in the ship and upon the proximity of magnetic and electrical equipment in relation to that position. Varying degrees of reliability and accuracy are, however, permitted, dependent on the function the compass is to perform and the overall length of the ship in which it is to be installed.

0.3 To obtain satisfactory and durable compensation of Class A magnetic compasses for use in sea navigation, the recommendations of this standard should be taken into consideration during the design stage of the vessel. These recommendations shall be considered as a general guide since these are not necessarily applicable to all types of sea-going ships.

0.4 This standard has been based on ISO/R 694-1968 'Positioning of magnetic compasses in ships' issued by International Organization for Standardization (ISO).

1. SCOPE

1.1 This standard gives general recommendations governing the minimum distance of a compass from magnetic material, taking into consideration the accuracy required for the compass for normal navigation.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Safe Distance—The minimum distance considered necessary for magnetic and electrical equipment and inductive circuits, in order to eliminate or greatly reduce interference with the performance of the compass.

2.2 Standard Compass — The standard compass is a magnetic compass which provides the primary means of navigating a ship. If there is only one magnetic compass, it shall be considered as the standard compass.

2.2.1 Such a compass or a repeater from it shall be sited in the vicinity of the position from which the vessel is ordinarily navigated and the view of the horizon from this position should be as uninterrupted as possible, for the purpose of taking bearings. In the sector from right ahead to 115° on either side, the view of the horizon may be interrupted only by masts, derrick posts, cranes and similar obstructions.

2.3 Steering Compass — The steering compass is a magnetic compass which provides the primary means by which the ship is steered. If the standard compass sited on the wheelhouse top is of the projector or reflector type, it may also act as the steering compass.

2.4 Stand-By Steering and Emergency Compasses — The stand-by steering and emergency compasses, if fitted, are magnetic compasses which provide the secondary means by which the ship is steered.

2.4.1 A stand-by steering compass is a steering compass fitted in a ship's wheelhouse, wherein the reflected or projected image of the standard compass is already available and principally used for steering.

2.4.2 An emergency compass is one fitted for the purpose of conning or steering the vessel after damage or breakdown of all other means of doing so.

2.5 Magnetic Elements — The magnetic elements are those used in navigational aids, which are not used for one of the purposes defined in **2.2, 2.3** and **2.4**.

3. MINIMUM DISTANCE REQUIREMENTS IN RELATION TO SHIP'S STRUCTURE

3.1 Standard Compass — A standard compass shall be positioned so as to comply with the minimum distance requirements for magnetic material which may be regarded as part of ship's structure, as shown in Fig. 1. Any magnetic material in the vicinity of the compass but outside of the minimum distances as shown in Fig. 1 shall, as far as possible, be disposed symmetrically relative to the compass.

3.2 Steering Compass — The distances as obtained from Fig. 1 may be reduced to 65 percent of those required for standard compass, provided no distance is less than 1 metre.

3.2.1 The distance from the deck below the compass may be reduced to 1 metre provided the distance from extremities of iron decks, bulkheads and girders is not less than 65 percent of the distances shown in Fig. 1 for the standard compass.

	SHIPS IN WHICH A CLASS 'A' COMPASS IS PRESCRIBED	FISHING VESSELS AND SHIPS DESIGNED FOR RESTRICTED SERVICE OF LESS THAN 60 m OVERALL LENGTH
Uninterrupted fixed magnetic material	—	
End parts of fixed magnetic material such as top edges of walls, partitions and bulkheads, extremities of frames, girders, stanchions, beams, pillars and similar steel parts.		— · — · — · —
Magnetic material subject to movement at sea such as davits, ventilators, steel doors, etc.	- - -	
Large masses of magnetic material with variable fields such as funnels.		

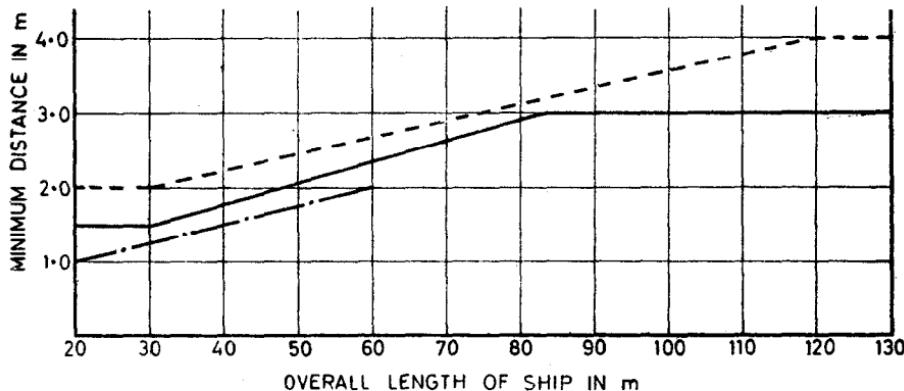


FIG. 1 MINIMUM DISTANCE REQUIREMENTS IN RELATION TO SHIP STRUCTURE FOR A STANDARD COMPASS

3.2.2 Movable magnetic parts in the vicinity of the steering compass, such as the steering gear, shall not influence the indication of such a compass.

3.2.3 The steering compass shall not be placed in a wheelhouse completely constructed of magnetic material.

3.2.3.1 If the wheelhouse is partly constructed of magnetic material, the magnetic parts shall be disposed symmetrically relative to the compass.

3.3 Stand-By Steering Compasses and Magnetic Elements—For stand-by steering compasses and magnetic elements, the distances from Fig. 1 shall be reduced to 50 percent provided no distance is less than 1 metre.

4. SAFE DISTANCE REQUIREMENTS FOR MAGNETIC AND ELECTRICAL EQUIPMENT AND ELECTRIC CABLES

4.1 Magnetic and electrical equipment and cables carrying direct current close to a magnetic compass are likely to produce a deviation in that compass.

4.1.1 Removal and replacement of any item of equipment is not likely to introduce any unacceptable deviation provided such items are not placed closer to the compass than its 'safe distance'.

4.2 The 'safe distance' for any item shall be measured from the centre of the compass to the nearest point of the item concerned, by one of the methods given in Appendix A.

4.3 The 'safe distance' determined as in **4.2** shall apply to standard compass only. For other compasses distances may be reduced.

4.4 For the steering compass of ships over 60 m overall length and for the standard compasses of ships designed for restricted service of less than 60 m overall length, the distance obtained from Appendix A may be reduced to 75 percent.

4.5 For steering compasses and for stand-by steering compasses of ships of less than 60 m overall length, and for magnetic elements, the 'safe distance' obtained from Appendix A may be reduced to 50 percent.

4.6 Manufacturers of magnetic and electrical equipment which are likely to be placed in the vicinity of the magnetic compass, shall determine the 'safe distance' by the methods indicated in Appendix A and shall declare the compass 'safe distance' for each item of equipment.

4.7 Items for which 'safe distance' is not known shall not be placed nearer to the standard compass than 7 m. For ships of overall length of less than 60 m, 'safe distance' may be reduced to 5 m.

4.8 When determining the 'safe distance' of large items of equipment, such as radar sets, gyro-compass, etc, a distinction is made for parts which are readily interchangeable and those which consist of large masses, the exchange of which may entail a considerable amount of work. In such cases the 'safe distance' of any item which is readily interchangeable shall be determined by the methods described in Appendix A. The remainder of the equipment comprising the large masses shall be treated as part of the ship's structure and, if required, the compass affected shall be re-adjusted.

4.9 Electric Wiring — Electric wiring carrying direct current, other than coils used for compass corrections, within 5 m of the magnetic compass shall be arranged non-inductively. Clips and conduits in the vicinity of magnetic compass shall be of non-magnetic material.

4.10 Magnetic compasses shall not be placed nearer than 2 metres to one another or to magnetic elements. In ships of less than 60 m length the distance between magnetic compasses may be reduced to 1.8 m and the distance between a magnetic compass and these magnetic elements to 1.5 m.

5. GENERAL

5.1 In special cases where the masses of iron in the vicinity of compasses are such that the compass does not function satisfactorily, the minimum safe distance shall be increased till the compass functions satisfactorily.

5.2 Items which are permanently fixed to the ship's structure shall be treated as part of the latter.

5.3 The funnel casing may be regarded as fixed magnetic material.

A P P E N D I X A

(*Clauses 4.2, 4.4, 4.5, 4.6 and 4.8*)

DETERMINATION OF SAFE DISTANCES

A-0. The safe distance for any item of equipment shall be determined by one of the two alternative methods described below. Each item shall be tested in the position and attitude relative to the compass or magnetometer at which the error produced at the compass would be a maximum, provided the item can be fitted in this way.

A-1. METHOD A: TESTING IN THE EARTH'S LOCAL MAGNETIC FIELD

A-1.1 The safe distance for any item is defined as the distance, measured between the nearest point of the item and the centre of the compass or magnetometer at which it will not produce a deviation in the standard compass of more than $\frac{0.045^\circ}{H}$, where H is the horizontal magnetic field strength in oersteds.

Each item shall be tested:

- in the magnetic condition in which it is received;
- after magnetization in a dc field of 1.5 oersteds with a superimposed stabilizing ac field of 18 oersteds rms at 50 c/s. (If damage to the equipment under test might result, the stabilizing field shall be omitted.) The direction of the field is that in which, as estimated by inspection or from drawings, the resultant magnetization will be greatest (for example, the long axis of a ferromagnetic box); and
- in the energized condition, if the item is capable of being energized electrically.

The greatest distance obtained from all these tests is the safe distance.

A-2. METHOD B: TESTING IN A REDUCED MAGNETIC FIELD

A-2.1 The safe distance for any item is defined as the distance, measured between the nearest point of the item and the centre of the compass, at which it shall not produce deviation in the standard compass of more than 0.5° , when tested in a horizontal magnetic field strength of 0.06 oersteds.

Each item shall be tested:

- a) in the magnetic condition in which it is received; and
- b) in the energized condition, if the item is capable of being energized electrically.

The greatest distance obtained from these tests is the safe distance.

Note — One ampere per metre = One oersted $\times \frac{10^8}{4\pi}$.

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